LORD LOVELACE'S COLLAR ROOF.

INSTITUTION OF CIVIL ENGINEERS.

At the meeting on Tuesday, June 12, Mr. J. Field, President, in the chair, "A description of the construction of a collar roof, with arched trusses of bent timber, at East Horsley Park," by the Earl of Lovelace, was read.

The roof, which covered a hall of 56 feet long by 24 feet wide, was described as being sustained by four arched trusses, springing from stone corbels. The ribs of these were each composed of four layers of deals, 3 inches thick, bent to the required form by steam heat. All the mouldings surrounding the tracery were also bent to the required forms in the same manner, thus giving, as was thought, great strength and lightness, as well as performing the work with greater economy of labour. The tracery was cut out from two thicknesses, half-an-inch each, of tub-stave oak, glued together, with the fibres at right angles to each other, which facilitated the carving, and gave greater strength to the minute tracery.

The ceiling was formed of half-inch diagonal boarding, and as the slate battens crossed it in a horizontal direction, the roof was strongly braced against the action of wind, and the staining of the alternate boards gave a pleasing variety of effect.

This kind of construction was first suggested by Colonel Emy, in his work on Carpentry, but he had applied it to much flatter roofs of large span, whereas Lord Lovelace's intention was to demonstrate its applicability to roofs for edifices in the Pointed and Tudor styles, and to show that great advantage would result from bending timbers rather than cutting them to the requisite forms; that the thrust of the roof might be entirely taken from the upper part of the walls, and carried far down them, and that such a construction might be adopted as would satisfy every condition of solidity, and, at the same time, admit of considerable decoration.

THE DOVER BREAKWATER.

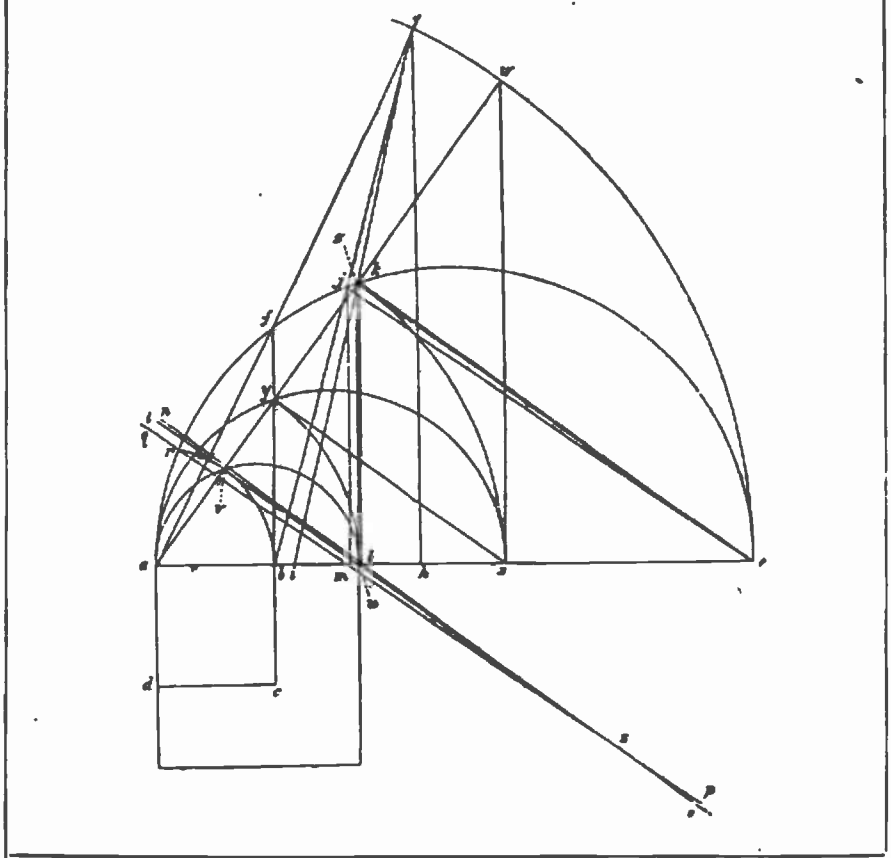
THE formation of the breakwater at Dover appears to be proceeding satisfactorily. It commences near the look-out house, and will run out into the sea, in cants about 800 feet, so as to form a harbour. A length of about 270 feet is done, and about 100 feet more will be added this season: the progress is regulated by the amount of money voted.

The outer faces of the breakwater are of Yorkshire stones (Bramleigh Fall), backed up with a course or two of Portland stone. The stones are very large, measuring above 80 feet cube in each. The space between the two walls is filled in solid with concrete. Large blocks of concrete are prepared (hard and dry), ready to use as they get out more into the sea, and two diving-bells are in daily use by the workmen. There is a steam-crane to raise the stone out of the ships, and the mills to grind lime for concrete, and brick-earth burnt for mortar, are worked by steam power. There is a large quantity of stone ready for setting.

The work appears to be well and carefully done, and is creditable to the contractors, Messrs. Lee, of Chiswell-street. Mr. Walker is the engineer.

BREAKWATERS AND LANDING PLACES.—We have lately inspected models of some inventions connected with landing-places, which seem to deserve the inspection of those whose attention is directed to such matters. They consist of a floating pier and buoys, double action yielding moorings, also an attached self-adjusting tidal ladder, constructed on a new principle, and which seems well suited for the purposes intended. The inventor has also constructed a life-boat and travelling crane, for the preservation of life from stranded vessels: this is attached to his floating pier,—which, from its construction, he considers will be enabled, at all times, and in all weathers, to maintain its position. The name of the inventor is Savage. A floating bath and breakwater, a floating light, and a plan for extinguishing fires on board ships, by the provision of a series of perforated pipes under the decks, bear further testimony to his ingenuity and skill.

MULTIPLICATION OF THE CUBE.



MULTIPLICATION OF THE CUBE.

THE attention of the writer was directed to this subject by the following passage, in the *Mechanic's Magazine*, for the 7th of last October, page 355:—"At this time Mr. Mackie, a Roman Catholic priest, published a duplication of the cube, the plausibility of which attracted attention, and, it is said, even obtained the assent of the teachers of Maynooth. Young Murphy, then eighteen years of age, answered this duplication in a pamphlet, entitled "Refutation of a pamphlet, written by the Rev. John Mackie, R.C.P., entitled 'A method of making a cube double of a cube on the principle of elementary geometry,' wherein his principles are proved erroneous, and the required solution not yet obtained." By Robert Murphy, Mallow, 1824, (20 pp.)

Let *abcd* be equal to one of the sides of the cube to be multiplied. Make the line *ae* as many times greater than the line *ab* as the required cube is to be greater than the given one; *ab* is the linear unit, *abcd* the square unit.

Upon *ae* describe the semicircle *aef*, draw *bf* at right angles to *ae*, with radius *ae* describe the arc *eg*, through the point *f* draw *ag*, draw *gh* parallel to *fb*, bisect the angle *egh* by the line *ig*, from the unit point *b* draw *bg*, from the points of intersection *j* and *k* draw *jm* and *kl* parallel to *fb*, draw *ke* and *fe*, draw *no* and *pq* respectively parallel to *ke* and *fe*, with *ab* for a radius describe the arc *br*, from the point of intersection *s* draw *st* tangential to the arc *br*; the square described upon *as* is equal to one of the sides of the required cube.

Demonstration. Upon *ae* describe the semi-circle *aue*, cutting the tangent *uv* and the arc *rb* in their common point *v*, through *v* draw *avs*, draw *ue* at right angles to *ae*, and complete the figure.

The apex *s* of the triangle *aev* in one particular case, will coincide with the points *f* and *k*; in all other cases, it must lie between them; the angles *feh* and *gvu* (formed by corresponding parallel lines) are equal, and are similarly divided by the parallel lines *ve* and *ve* (the last by the construction at right angles to the unit radius *ae*); the right-angled triangle *aue* inscribed in its semi-circle is equal to the right-angled triangle *aby*, and the hypothenuse *ae* is equal to the hypothenuse *ay*; the right-angled triangle *aue* is equal to the triangle *aev* inscribed in its semi-circle, and the side *as* is equal to the side *ae*.

By similar triangles,

$av = 1 : ay = au :: ae : as = ae = ae^2$

$av = 1 : ae = ae^2 :: au : ae = ae^2$

Numerals.	Cubes.
$ab = 1$	
$ab^3 = 1^3$	
$ae = ae^3 = ae \times 1^3$	

The cube represented by the numeral ae^3 is as many times greater than the cube denoted by ab^3 as the line ae is greater than the line ab.

$bx = ax - 1 : by :: by : ab = 1 . by = \sqrt{ax - 1}$

$ab = 1 : by = \sqrt{ax - 1} :: au = \sqrt{ax} : ux = uy = \sqrt{ax} . \sqrt{ax - 1} .$

$ay = \sqrt{ax} .$

$xy^2 + ay^2 = ax^2 - ax + ax$

Squares described upon xy and ay are together equal to the square described upon the hypothenuse ax. J. P. W.

*** The above is to be regarded merely as an approximation, our correspondent's demonstration being incomplete.—ED.

METROPOLITAN COMMISSION OF SEWERS.

A GENERAL court was held on Thursday, the 7th instant, at the Sewers Court, Greek-street; the Earl of Carlisle in the chair.

The Sewage Manure of the Metropolis.—A report was read from Mr. Donaldson, assistant-surveyor, on recent experiments made by him with sewage manure at Bromford, Hanwell, &c., and with very satisfactory results. The operations had been conducted by the use of the hose and jet. The average quantity supplied was 110 tons per acre; the time occupied being one hour and five minutes per acre, and the cost 1s. 8d., exclusive of its conveyance. In reference to this report, a recommendation was received from the Sewage Manure Committee that advertisements be issued, inviting offers from the owners and occupiers of land at a moderate distance from town to take the sewage, the supply to be at the rate of eighteen irrigations per annum of 250 tons each, and stating that the metropolitan districts would yield sewage matter equal to the irrigation of 150,000 acres.

Mr. Chadwick rose to move the adoption of the recommendation, and in doing so, remarked on the important results arrived at by the use of

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